

WHAT IS CLAIMED IS:

1. A vacuum deposition system comprising a film-forming chamber to be kept at a stated degree of vacuum, and provided therein a substrate holder which
5 holds a substrate and a vapor-generating means which generates a vapor of a deposition material which is to be vacuum-deposited on the surface of the substrate to come into a thin film, the system further comprising:

a reaction chamber provided therein with an
10 ionization means which ionizes by the plasma a source gas for compensating atoms coming short in the thin film; and

a communicating portion which makes the inside of the film-forming chamber and the inside of the reaction
15 chamber communicate with each other and has a pressure control means which controls differential pressure between the film-forming chamber and the reaction chamber.

20 2. The vacuum deposition system according to claim 1, which comprises a microwave-generating means for introducing microwaves into the reaction chamber.

25 3. The vacuum deposition system according to claim 1, which comprises a high-frequency power source for supplying a high-frequency power into the reaction chamber.

4. The vacuum deposition system according to claim 1, wherein the pressure control means is a pressure control valve.

5 5. The vacuum deposition system according to claim 1, which comprises a gas feed means for feeding the source gas into the reaction chamber.

10 6. The vacuum deposition system according to claim 5, wherein the gas feed means is a means for feeding into the reaction chamber at least one of oxygen gas and fluorine gas as the source gas.

15 7. A thin-film deposition process which forms a thin film by means of the vacuum deposition system according to claim 1, the process comprising the steps of:

20 ionizing the source gas in the reaction chamber and thereafter opening the pressure control means of the communicating portion to introduce an ionized source gas into the film-forming chamber; and

generating a vapor of the deposition material in the film-forming chamber to form the thin film.

25 8. The thin-film deposition process according to claim 7, wherein the film-forming chamber is kept at an internal pressure of 13 mPa or less, and the reaction

chamber is kept at an internal pressure of from 0.3 Pa
to 7 Pa.

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